CLAIMS

What is claimed is:

1. A system that facilitates determining equilibrium values, comprising:

a component that receives data relating to supply and demand data for a system and demarcates at least a subset of the data relating to at least one agent operating within the system into demander data and supplier data, respectively; and

an approximation component that applies a polynomial-time approximation method to the demarcated data in connection with generating an approximate equilibrium value for the system.

2. The system of claim 1, the system comprising a market system, the demander data comprising buyer data, the supplier data comprising seller data, and the approximate equilibrium value comprising an approximate equilibrium price vector for the market system.

3. The system of claim 2, the approximate equilibrium price vector, comprising an approximate equilibrium price vector, $\mathbf{p}^*$, that produces, in conjunction with a bundle of goods, x^i, for each agent i, an ε-approximate equilibrium for the market system such that:

for every good j:

$$(1-\varepsilon)\sum_{i=1}^{n} w_j^i \le \sum_{i=1}^{n} x_j^i \le \sum_{i=1}^{n} w_j^i;$$

for all i, a utility, $\sum_{j=1}^{m} u_{ij} x_j^i$, of agent i is at least $(1-\varepsilon)$ times a value of an optimum solution of a maximization of utility function, $u_i(x)$, subject to:

$$\sum_{j=1}^{m} p_j^* x_j \le \sum_{j=1}^{m} p_j^* w_j^i; \qquad \text{(Eq. 1)}$$

where m represents types of divisible goods being traded in the market system and w_j^i indicates an initial amount of good j that agent i possesses.

4. The system of claim 2, the polynomial-time approximation method comprising an iterative method that utilizes, at least in part, revenue generated in a previous iteration for a specific agent as a budget for the specific agent in a current iteration.

5. The system of claim 4, the iterative method further utilizes a dummy buyer to account for residual goods.

6. The system of claim 1, the polynomial-time approximation method comprising, at least in part, a linear utility function relating to at least one agent.

7. The system of claim 1, the system comprising a network system, the demander data comprising network client capacity demand data, the supplier data comprising server capacity supply data, and the equilibrium value comprising approximate equilibrium capacity values of the network system.

8. The system of claim 2, the polynomial-time approximation method comprising, at least in part, a polynomial-time method that employs a dichotomous market solution algorithm.

9. The system of claim 8, the dichotomous market solution algorithm comprising a primal-dual heuristics algorithm.

10. The system of claim 8, the dichotomous market solution algorithm comprising a convex programming algorithm.

11. The system of claim 2, the polynomial-time approximation method yields an exact equilibrium price for the market system.

12. A method for facilitating determination of equilibrium values, comprising:

receiving data relating to supply and demand data for a system;

demarcating at least a subset of the data relating to at least one agent operating within the system into demander data and supplier data, respectively; and

applying a polynomial-time approximation method to the demarcated data in connection with generating an approximate equilibrium value for the system.

13. The method of claim 12, the system comprising a market system, the demander data comprising buyer data, the supplier data comprising seller data, and the approximate equilibrium value comprising an approximate equilibrium price vector for the market system.

14. The method of claim 13, the approximate equilibrium price vector, comprising an approximate equilibrium price vector, $\mathbf{p}^*$, that produces, in conjunction with a bundle of goods, x^i, for each agent i, an ε-approximate equilibrium for the market system such that:

for every good j:

$$(1-\varepsilon)\sum_{i=1}^{n} w_j^i \leq \sum_{i=1}^{n} x_j^i \leq \sum_{i=1}^{n} w_j^i;$$

for all i, a utility, $\sum_{j=1}^{m} u_{ij} x_j^i$, of agent i is at least $(1-\varepsilon)$ times a value of an optimum solution of a maximization of utility function, $u_i(x)$, subject to:

$$\sum_{j=1}^{m} p_j^* x_j \leq \sum_{j=1}^{m} p_j^* w_j^i; \qquad \text{(Eq. 1)}$$

where m represents types of divisible goods being traded in the market system and w_j^i indicates an initial amount of good j that agent i possesses.

15. The method of claim 13, the polynomial-time approximation method comprising an iterative method that utilizes, at least in part, revenue generated in a previous iteration for a specific agent as a budget for the specific agent in a current iteration.

16. The method of claim 15, the iterative method further utilizes a dummy buyer to account for residual goods.

17. The method of claim 13, the polynomial-time approximation method comprising, at least in part, a polynomial-time method that employs a dichotomous market solution algorithm.

18. The method of claim 17, the dichotomous market solution algorithm comprising a primal-dual heuristics algorithm.

19. The method of claim 17, the dichotomous market solution algorithm comprising a convex programming algorithm.

20. The method of claim 13, the polynomial-time approximation method yields an exact equilibrium price for the market system.

21. The method of claim 13, the polynomial-time approximation method comprising:

initializing with an arbitrary first price vector;

setting a variable, D, to represent a maximum deficiency of the price vector;

constructing an instance, M_p, of a dichotomous market;

executing a dichotomous market solution algorithm on the instance, M_p, of the dichotomous market and outputting a second price vector;

setting a budget for i for every agent i with respect to the second price vector according to:

$$e_i' := \sum_{j=1}^{m} p_j' w_j^i ;$$

determining if a budget ratio for every agent i satisfies a budget ratio constraint of:

$$e_i'/e_i \leq 1+\varepsilon ,$$

where ε represents a desired amount of approximation;

outputting the second price vector when the budget constraint is satisfied, as the approximate equilibrium price vector for the market system; and

iterating the polynomial-time approximation method with the first price vector set equal to the second price vector when the budget constraint is unsatisfied.

22. The method of claim 21, constructing the instance, M_p, of the dichotomous market comprising:

providing m types of goods and $n+1$ buyers;

setting, for $i = 1,...,n$, a utility of buyer i for the goods as a utility of a corresponding agent in an original instance; and

establishing the budget of buyer i according to:

$$e_i := \sum_{j=1}^{m} p_j w_j^i ,$$

where buyer $(n+1)$ has a budget of $e_{n+1} := D$ and a utility for good j is equal to a price of good j, p_j.

23. A system that facilitates determination of equilibrium values, comprising:

means for receiving data relating to supply and demand data for a system, and demarcating at least a subset of the data relating to at least one agent operating within the system into demander data and supplier data, respectively; and

means for applying a polynomial-time approximation method to the demarcated data in connection with generating an approximated equilibrium value for the system.

24. The system of claim 23, the system comprising a market system, the demander data comprising buyer data, the supplier data comprising seller data, and the approximate equilibrium value comprising an approximate equilibrium price vector for the market system.

25. The system of claim 24, the polynomial-time approximation method comprising an iterative method that utilizes, at least in part, revenue generated in a previous iteration for a specific agent as a budget for the specific agent in a current iteration.

26. The system of claim 24, the polynomial-time approximation method employs, at least in part, a dichotomous market solution algorithm to provide at least one selected from the group consisting of an approximate market equilibrium price and an exact equilibrium market price.

27. A data packet, transmitted between two or more computer components, that facilitates equilibrium value determination, the data packet comprising, at least in part, information relating to an equilibrium value determination system that utilizes, at least in part, demarcation of agent related data into buyer data and seller data to employ in a polynomial-time approximation method that generates an approximated equilibrium value for the system.

28. A computer readable medium having stored thereon computer executable components of the system of claim 1.

29. A device employing the method of claim 12 comprising at least one selected from the group consisting of a computer, a server, and a handheld electronic device.

30. A device employing the system of claim 1 comprising at least one selected from the group consisting of a computer, a server, and a handheld electronic device.